REMARKS

In response to the Examiner's Action mailed October 21, 2002, the Applicants respectfully request reconsideration in view of the following remarks.

I. Non-responsive Communication.

The Examiner indicated that the Applicant's communication filed on 7/24/02 was non-responsive because of conflicting claim amendment and cancellation. Specifically, Claims 20 and 21, while described as canceled in the body of the communication, were then shown as amended claims in the Appendix to the communication.

The Applicants therefore reconfirm that Claims 20 and 21 are canceled. The Appendix to the communication filed on 7/24/02 mistakenly labeled amended Claim 18 and 19 as Claims 20 and 21, respectively. The Applicants apologize for these inadvertent typographical errors. To clarify the intended amendments, the amendments introduced in the communication filed on 7/24/02 are repeated above and in the attached pages with markings to show the changes.

II. Conclusion

In view of the foregoing amendment and remarks, the Applicants now see all of the Claims currently pending in this application to be in condition for allowance and therefore earnestly solicit a Notice of Allowance for Claims 9-13, 18-19 22-24, 27, 36 and 37.

The attached page captioned "**Version with markings to show changes made.**" hereto is a repeat of the marked-up version of the claim amendments made in the communication filed on 7/24/02.

The Applicants respectfully submit that the foregoing claims are allowable. Therefore, a Notice of Allowance for Claims 9-13, 18-19 22-24, 27, 36 and 37 is respectfully requested.

The Applicants request the Examiner to telephone the undersigned attorney of record at (972) 480-8800 if such would further or expedite the prosecution of the present application.

Respectfully submitted,

HITT GAINES & BOISBRUN, P.C.

Charles W. Gaines
Registration No. 36,804

Dated: 11/20/02

HITT GAINES & BOISBRUN, P.C.
P.O. Box 832570
Richardson, Texas 75083
Phone: (972) 480-8800
Fax: (972) 480-8865

Email: cgaines@abstractassets.com

DOCKET NO. MILLS 9-10

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

(1) Claims 15 and 17 are canceled without prejudice or disclaimer.

(2) Claim 18 is amended as follows:

18. (Amended) The method of claim [17] <u>37</u>, wherein the oligomers independently comprise subunits selected from the group consisting of deoxyribonucleotides, ribonucleotides, and analogs of deoxyribonucleotides or ribonucleotides; and any single oligomer comprises one or a combination of two or more of said different types of subunits.

(3) Claim 19 is amended as follows:

19. (Amended) The method of claim [17] <u>37</u> wherein each of said oligomers forming said content addressable memory matrix T_{ij} comprises, in order from the 5' end to the 3' end, (a) an oligomer strand comprising a nucleotide sequence representing an i-th component of V selected from the group consisting of E_i and $\underline{E}i$ for i = 1 to i = m, (b) an oligomer strand comprising a nucleotide sequence representing a j-th component of V selected from the group consisting of E_j and $\underline{E}_j$ for j = 1 to j = m, wherein $j \neq i$, and (c) a nucleotide sequence F that is not complementary to any sequence E_i or $\underline{E}_i$ for i = 1 to i = m.

(4) Claims 20-21 are canceled without prejudice or disclaimer.

(5) Claim 22 is amended as follows:

22. (Amended) The method of claim 37 wherein said single-stranded oligorners comprising a complete, substoichiometric set of E_i of step (c) and E_i are anchored to a solid support.

(6) Claim 27 is amended as follows:

27. (Thrice Amended) The method of claim [11] $\underline{9}$ wherein said operation of matrix $\underline{\text{or}}$ $\underline{\text{vector}}$ algebra is determining the inner product of two vectors $\boldsymbol{V}$ and $\boldsymbol{W}$, and said method comprises:

(i) obtaining for each vector $\boldsymbol{V}$ and $\boldsymbol{W}$, sets of single-stranded oligomers E_i and $\underline{E}_i$ representing the components of the vector, wherein the concentrations of the oligomers E_i and $\underline{E}_i$ are proportional to the absolute values of the amplitudes of the components they represent; and

also obtaining a set of single-stranded oligomers E_i and $\underline{E}_i$ representing the components of vector $\underline{\boldsymbol{W}}$ that are complementary to said oligomers representing vector $\boldsymbol{W}$, wherein the relative concentrations of the oligomers representing $\underline{\boldsymbol{W}}$ are proportional to the concentrations of their complementary oligomers in $\boldsymbol{W}$;

(ii) combining samples of the oligomers representing vector $\boldsymbol{V}$ with samples of the oligomers representing vectors $\boldsymbol{W}$ and $\underline{\boldsymbol{W}}$ in separate $\underline{\text{respective first and second}}$ reaction mixtures and measuring [the] $\underline{R_+ \text{ and } R_-}$ rates of hybridization [of said] $\underline{\text{associated with the respective first and second}}$ mixtures, and obtaining a numerical value proportional to the inner product of the two vectors from [said] $\underline{\text{a difference between said } R_+ \text{ and } R_-}$ rates of hybridization.

(7) Add new claim 36 as follows:

36. (New) The method of claim 9, wherein said operation of matrix or vector algebra includes obtaining an outer product matrix of two vectors V_i for $i = 1, 2, ..., m$, and W_j for $j = 1, 2, ..., n$,

wherein said step of subjecting comprises obtaining a set of dimeric, single-stranded oligomers to represent an outer product of vectors V and W, each of said dimeric oligomers comprising (i) a first single-stranded oligomer sequence selected from the group consisting of E_i or $\underline{E}_i$ for each i-th component of V for $i = 1, 2, ... m$, which oligomer is joined at its 3' end to the 5' end of (ii) a second single-stranded oligomer sequence selected from the group consisting of E_j or $\underline{E}_j$ for each j-th component of W for all $j = 1, 2, ... n$,

wherein the step of detecting includes determining the concentration of said dimeric oligomers comprising oligomer sequences corresponding to the i-th component of V and the j-th component of W.

(8) Add new claim 37 as follows:

37. (New) A method for obtaining a data set V_i^b from an oligomer-based, content-addressable memory following input of a data set U_i^b that represents a portion of

V_i^b,

wherein data elements in the form of m-component vectors $V = \sum_i V_i \mathbf{e}_i$ are represented in the memory by a set of the oligomers E_i and $\underline{E}_i$ that are a subset of all single-stranded oligomers and are in 1:1 correspondence with the basis vectors $\mathbf{e}_i$ for $i = 1, 2, ...m$ in an abstract m-dimensional vector space;

wherein oligomers E_i and $\underline{E}_i$ have complementary nucleotide sequences, with E_i oligomers representing the i-th component of $\boldsymbol{V}$ for which the amplitude V_i is positive, and $\underline{E}_i$ representing the i-th component of $\boldsymbol{V}$ for which V_i is negative; and

wherein the concentration of each of oligomers E_i and $\underline{E}_i$ is proportional to the absolute value of the amplitude V_i of the i-th component of $\boldsymbol{V}$;

the method comprising:

(a) preparing a content-addressable memory representing memory matrix T_{ij} in which are stored data sets corresponding to vectors V_i^a for a = 1 to a = n, where i = 1, 2, ..., m, wherein T_{ij} is the sum of all of the outer products $V_i^a V_j^a$ for $i \neq j$, the preparing of the memory representing the matrix T_{ij};

comprising obtaining for each vector $\boldsymbol{V}^a$ a set of dimeric single-stranded oligomers, each of which comprises a first single-stranded oligomer sequence selected from the group consisting of E_i or $\underline{E}_i$ for each i-th component of $\boldsymbol{V}^a$ for i = 1 to i = m, and further comprises a second single-stranded oligomer sequence selected from the group consisting of E_j or $\underline{E}_j$ for each j-th component of $\boldsymbol{V}^a$ for j = 1 to j = m, except for i = j; and then pooling said sets of dimeric oligomers obtained for each vector $\boldsymbol{V}^a$ for a = 1 to a = n to form the set of oligomers of the content-addressable memory representing the matrix T_{ij};

(b) combining said pool of dimeric oligomers with a set of oligomers representing partial data Set U_i^b under conditions wherein oligomer sequences E_i^b and $\underline{E}_i^b$ of data set U_i^b hybridize specifically to complementary sequences E_j and $\underline{E}_j$ present in said memory pool oligomers; and obtaining an isolated set of monomeric oligomer strands X_i comprising the first single strand oligomer sequences E_i and $\underline{E}_i$ of said memory pool of dimeric single stranded oligomers that hybridized specifically to

said U_i^b oligomers, wherein said X_i oligomers do not further comprise said E_j and $\underline{E}_j$ oligomers of the second single-stranded sequences of said memory pool oligomers that are complementary to said U_i^b oligomers;

(c) combining said set of X_i oligomers with a set of single-stranded saturating oligomers comprising a set of E_i and $\underline{E}_i$ oligomers representing the complete set of basis vectors $\mathbf{e}_i$ for i = 1 to m, wherein the E_i and $\underline{E}_i$ oligomers are substoichiometric relative to said set of X_i oligomers, in that the number of oligomers in the set of X_i oligomers is greater than the number of saturating oligomers, so that complementary sequences hybridize to each other, denaturing the resulting duplex molecules, and isolating the subset of X_i oligomer that hybridized specifically to said E_i and $\underline{E}_i$ sequences, to obtain a set of saturated X_i strands, S(Xi);

(d) repeating steps (b) and (c) iteratively, using the set of saturated X_i strands, $S(X_i)$ obtained in each previous implementation of step (c) as the set of oligomers representing partial data set U_i^b employed in the subsequent implementation of step (b), until successive iterations yield the same set of oligomer strands X_i produced by step (b) that represents data set V_i^b .